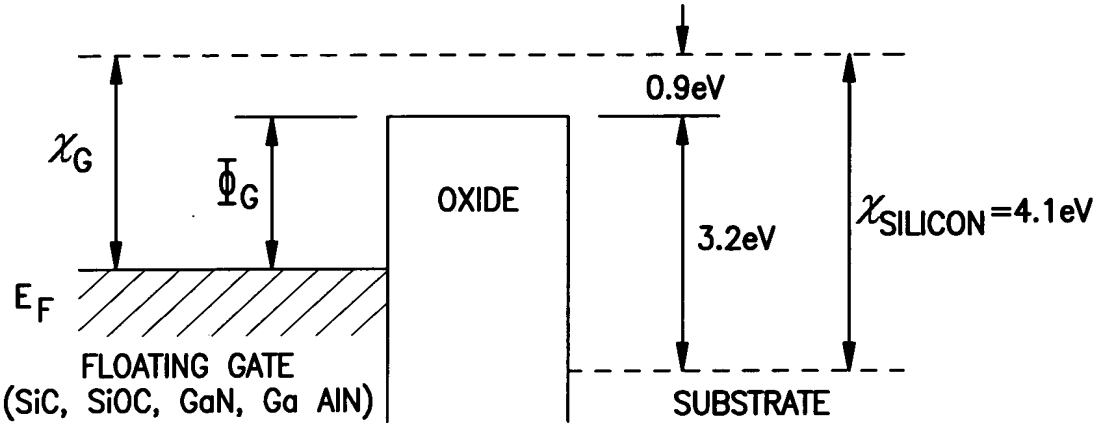


FIG. 1A
(PRIOR ART)

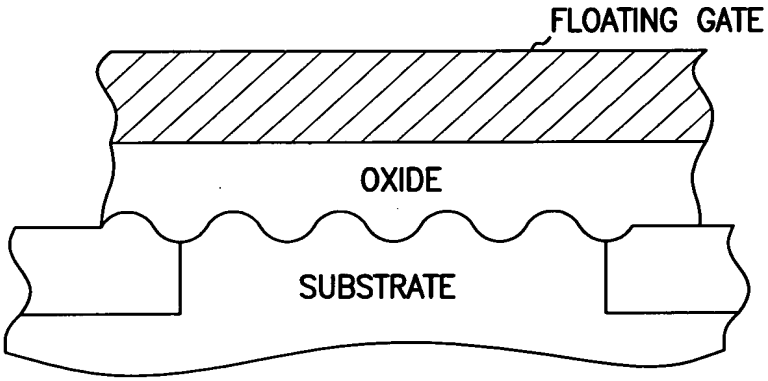


FIG. 1B
(PRIOR ART)

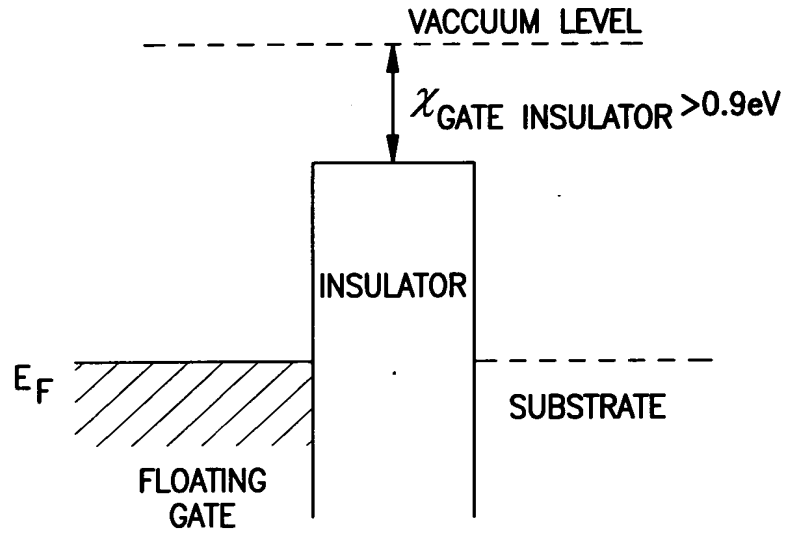


FIG. 1C
(PRIOR ART)

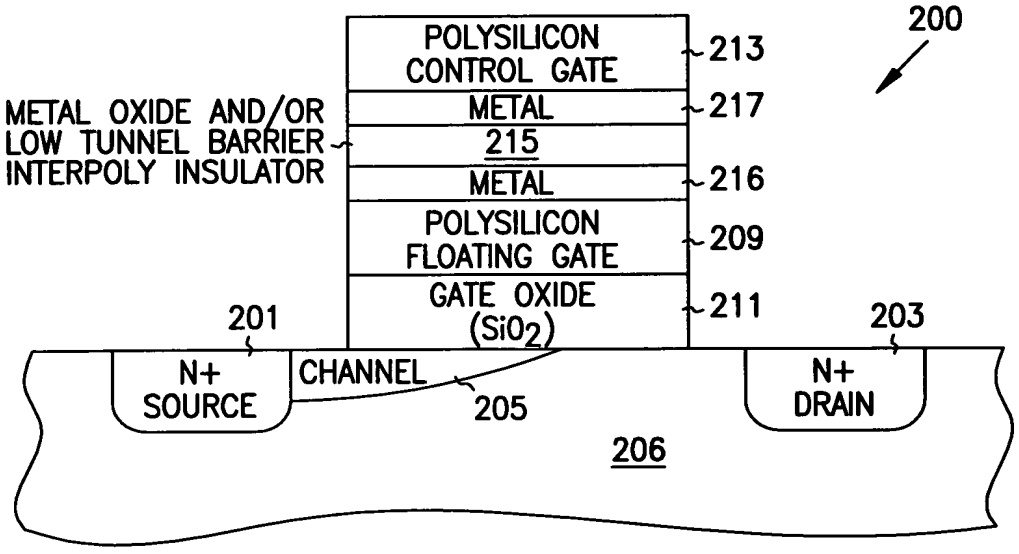


FIG. 2

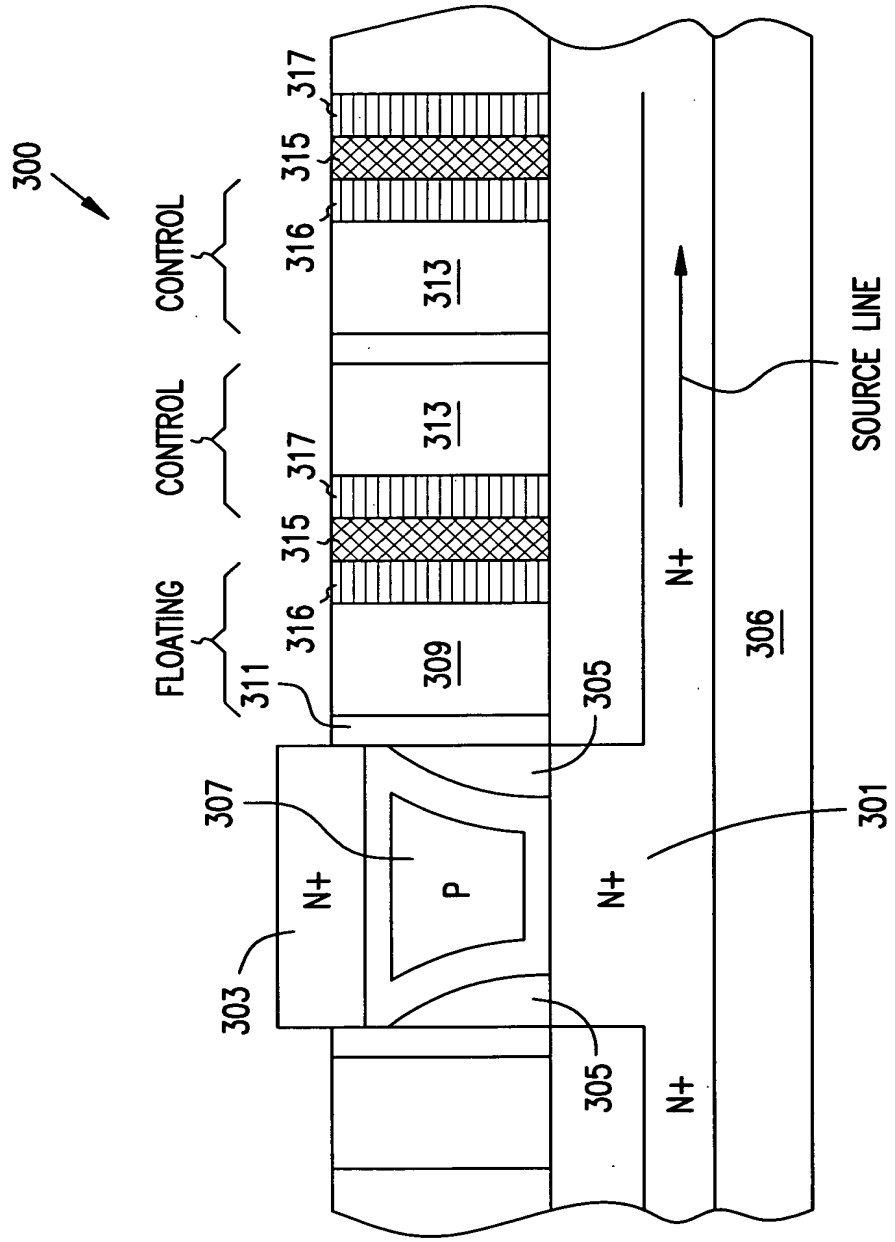

300
CONTROL
CONTROL
FLOATING
317
315
316
313
313
317
315
316
309
311
305
307
303
N+
P
N+
305
N+
306
301
SOURCE LINE

FIG. 3

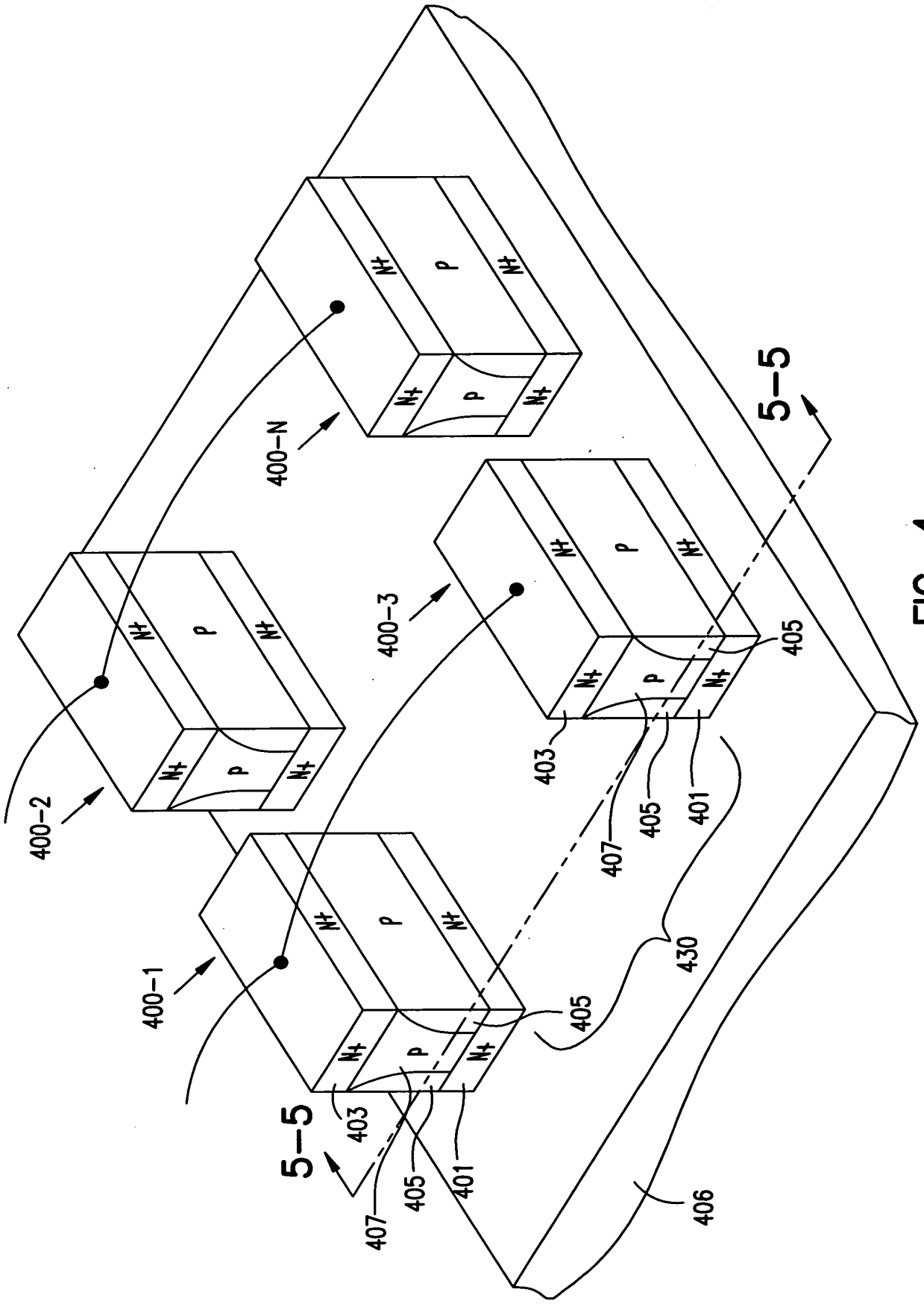


FIG. 4

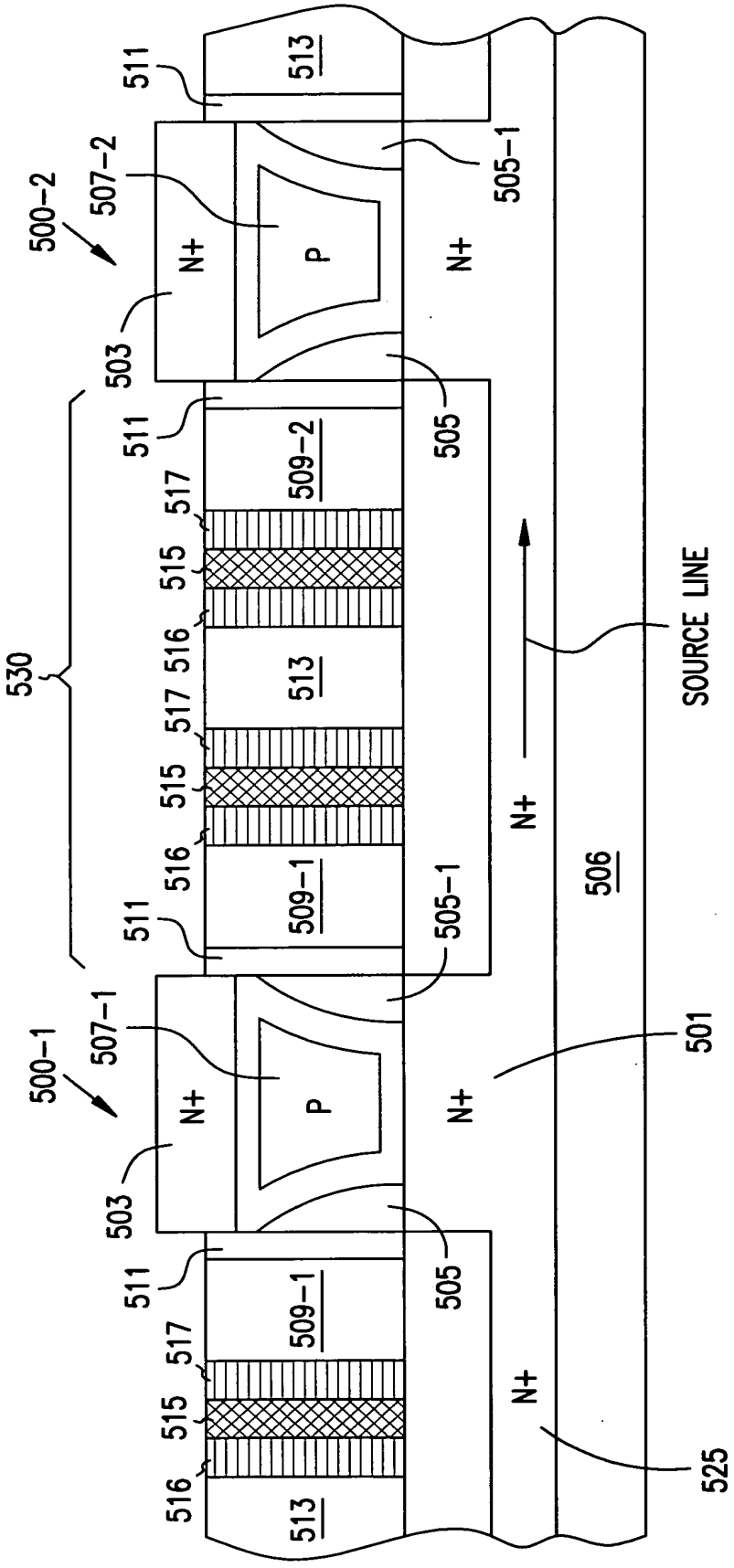

511
513
500-2
507-2
505-1
N+
P
N+
503
505
511
509-2
517
515
516
513
530
SOURCE LINE
N+
506
511
509-1
505-1
500-1
507-1
501
N+
P
N+
503
505
511
509-1
517
515
516
513
N+
525

FIG. 5A

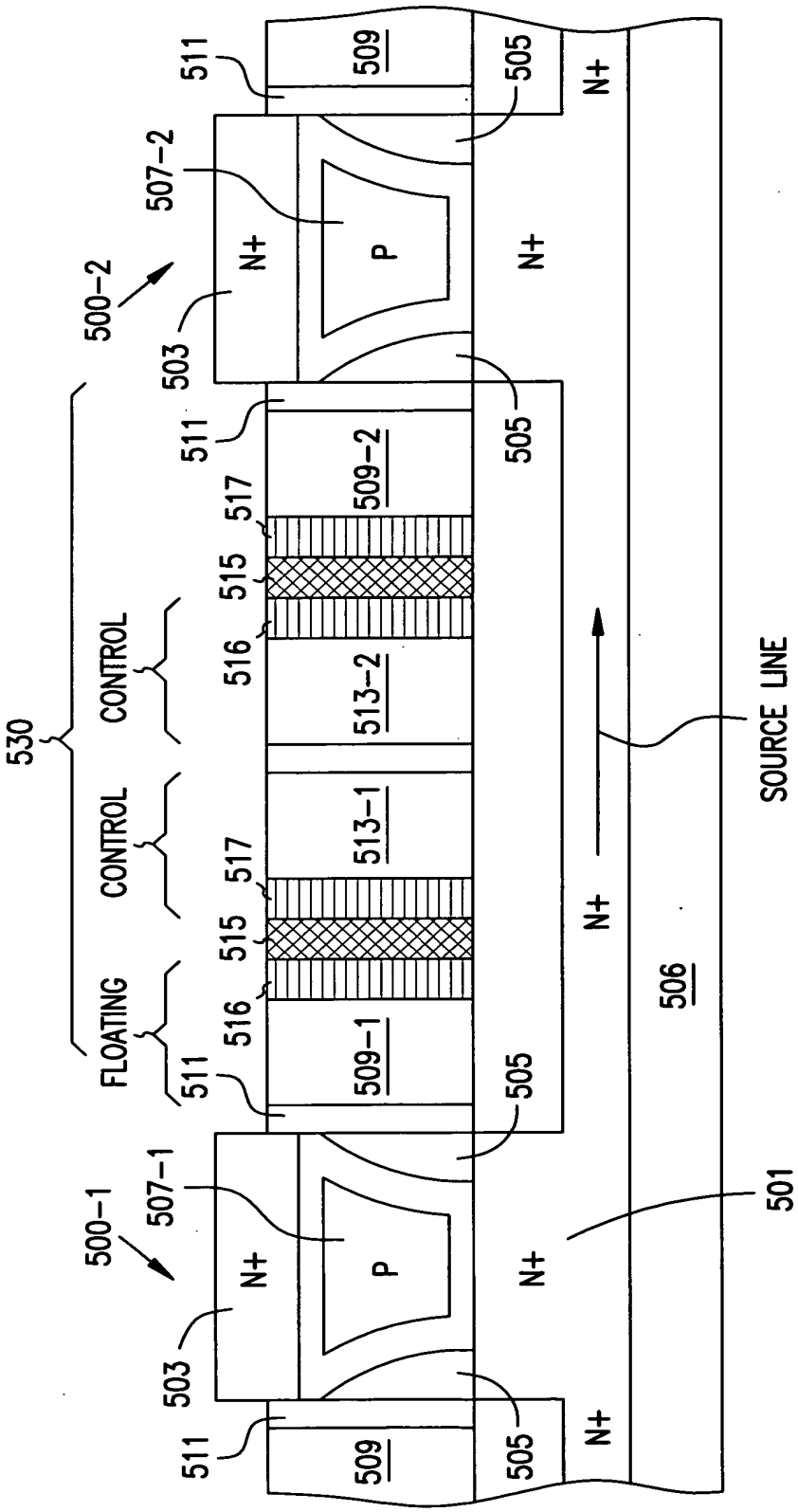

500-1
500-2
507-1
507-2
503
505
509
509-1
509-2
511
513-1
513-2
515
516
517
530
CONTROL
CONTROL
FLOATING
N+
P
501
506
SOURCE LINE

FIG. 5B

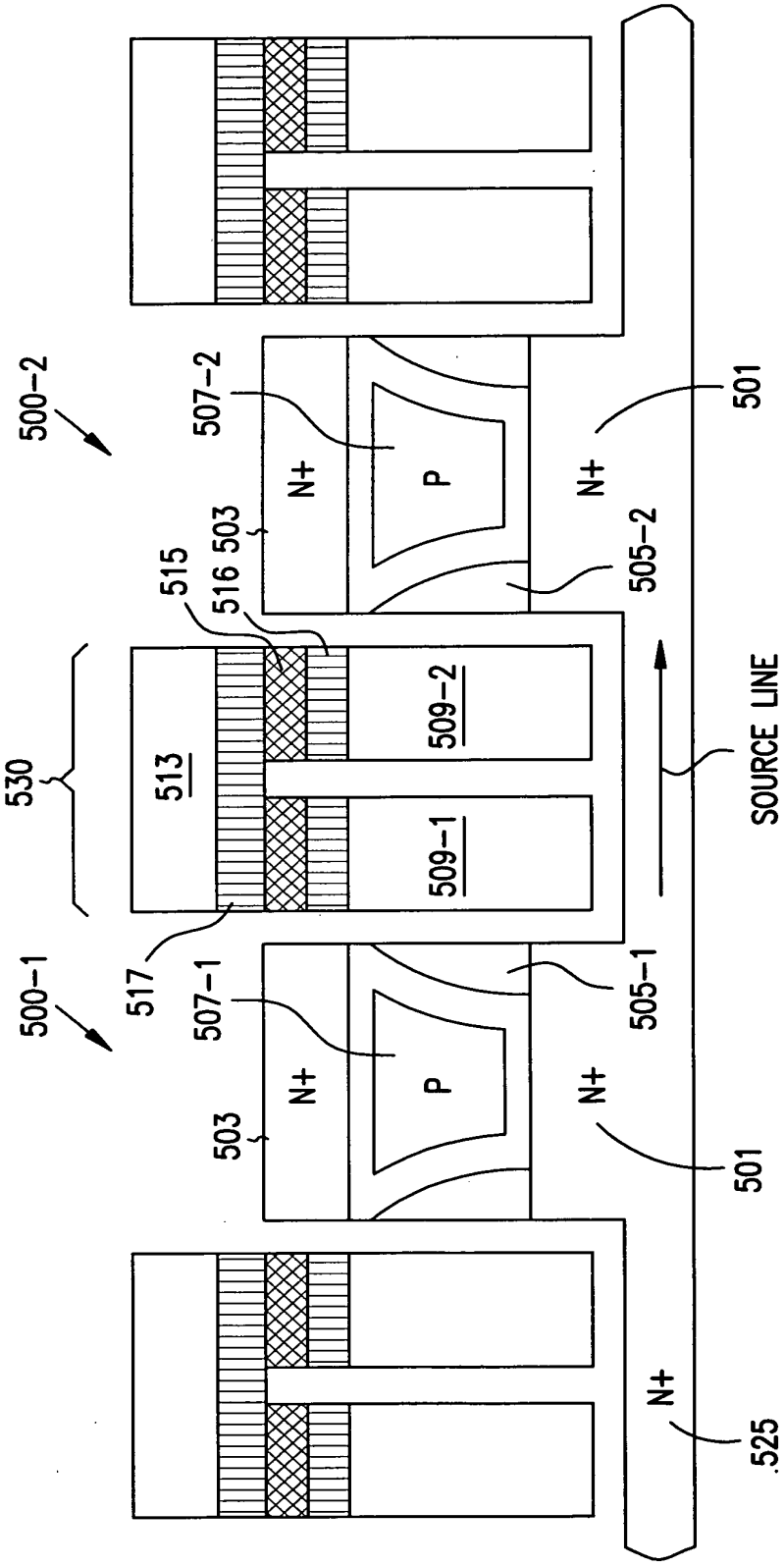

500-2
507-2
N+
P
N+
501
503
505-2
515
516
513
509-2
509-1
530
SOURCE LINE
517
500-1
507-1
505-1
503
N+
P
N+
501
N+
525

FIG. 5C

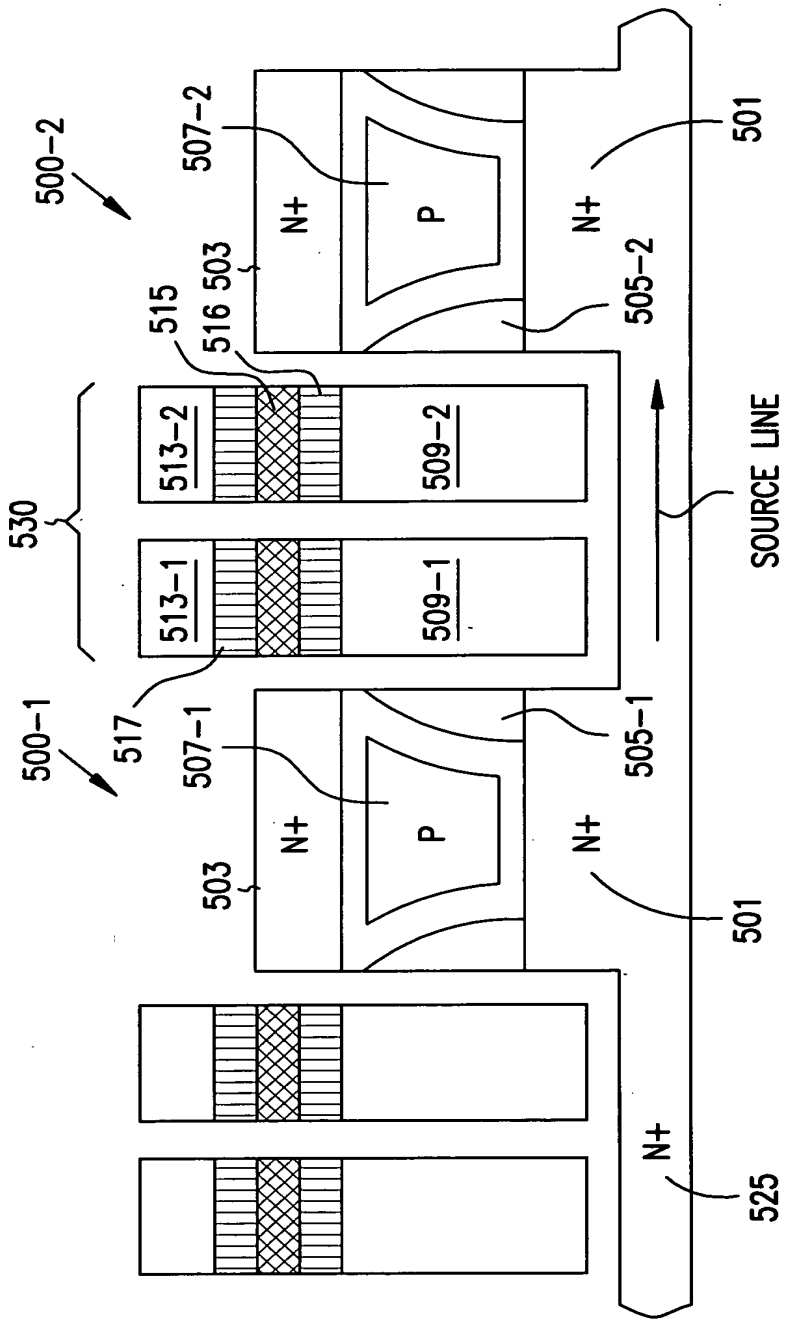

500-2
507-2
N+
P
N+
501
503
515
516
505-2
513-2
509-2
530
513-1
509-1
SOURCE LINE
500-1
517
507-1
505-1
N+
P
N+
503
501
N+
525

FIG. 5D

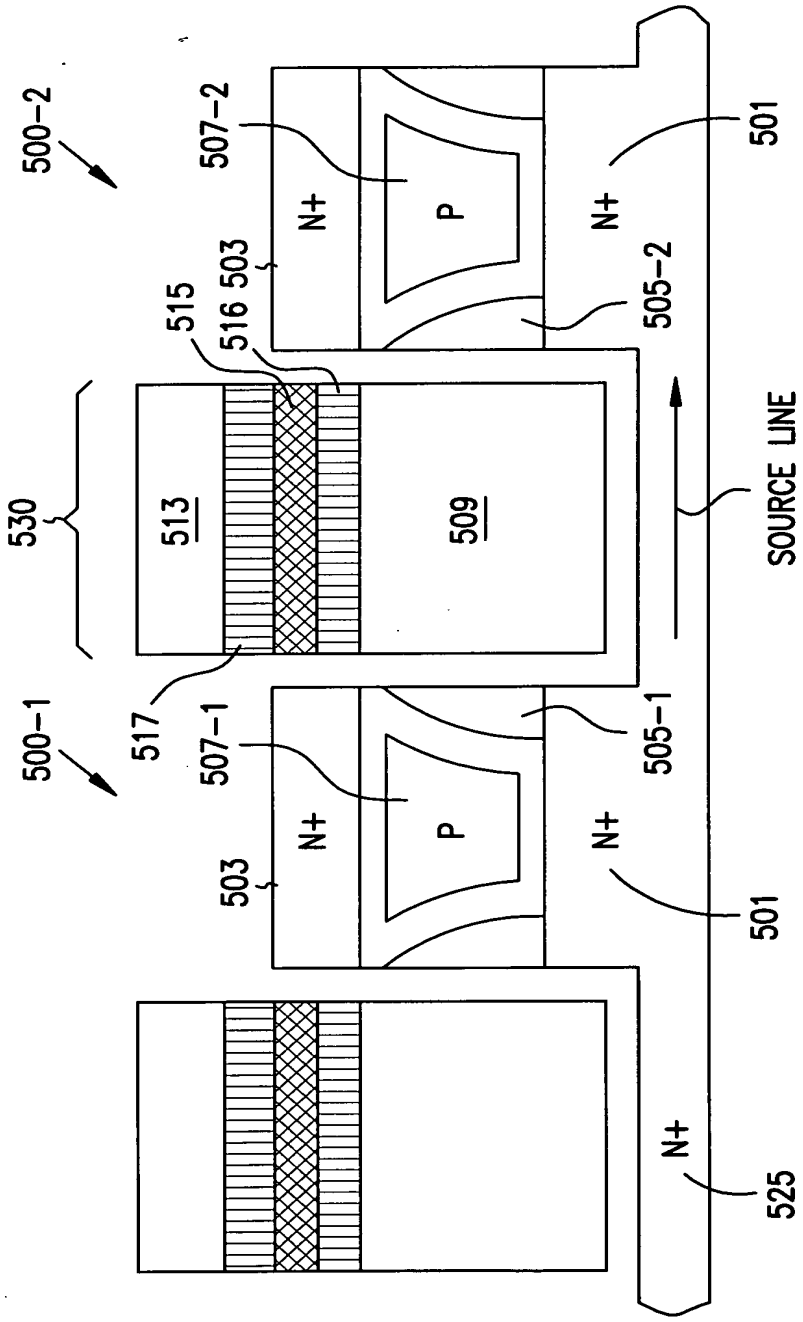

500-2
507-2
N+
P
N+
501
503
515
516
505-2
530
513
509
SOURCE LINE
517
500-1
507-1
505-1
N+
P
N+
503
501
N+
525

FIG. 5E

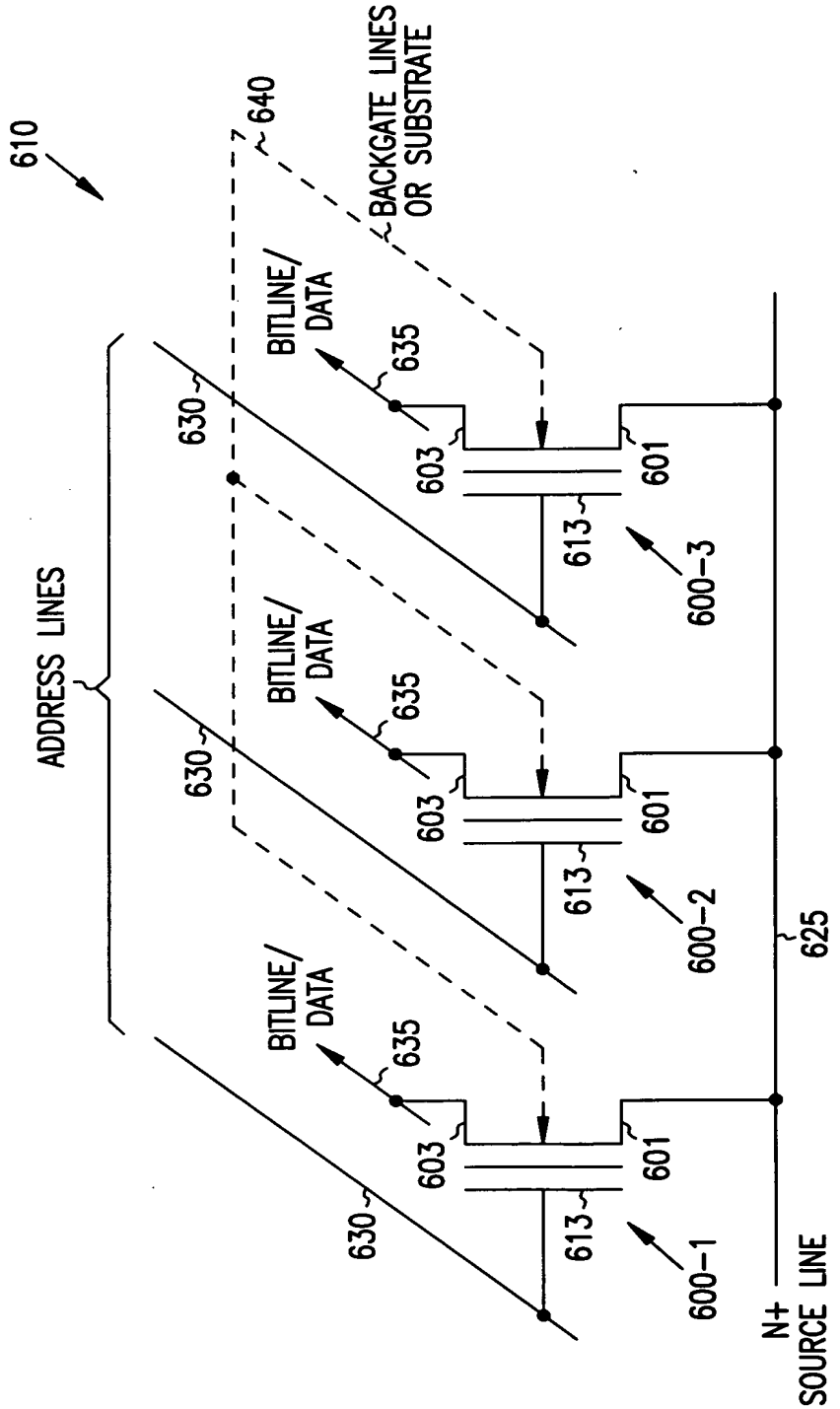

610
640
BACKGATE LINES OR SUBSTRATE
ADDRESS LINES
BITLINE/ DATA
635
630
603
601
613
600-3
600-2
600-1
625
N+ SOURCE LINE

FIG. 6A

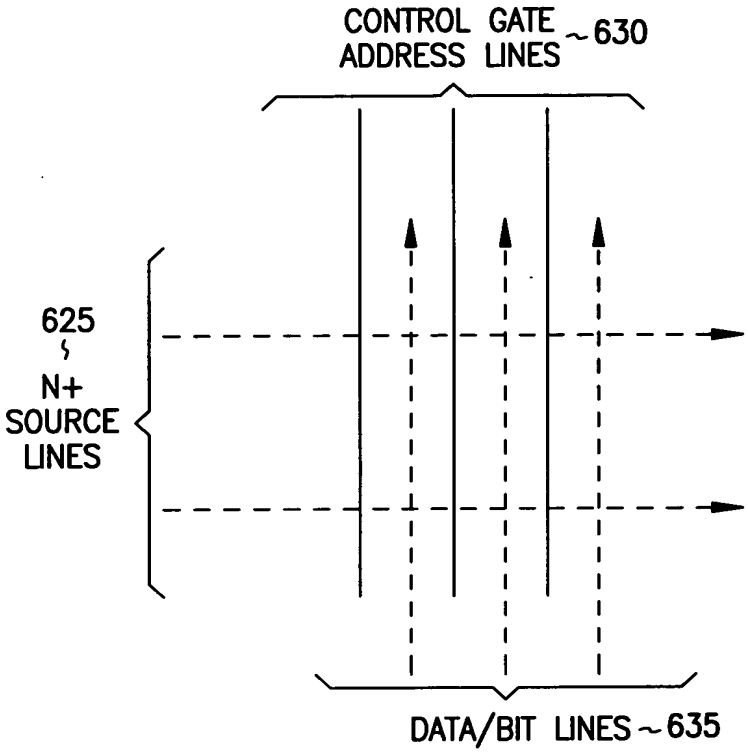

CONTROL GATE ADDRESS LINES ~630
625
N+ SOURCE LINES
DATA/BIT LINES ~635

FIG. 6B

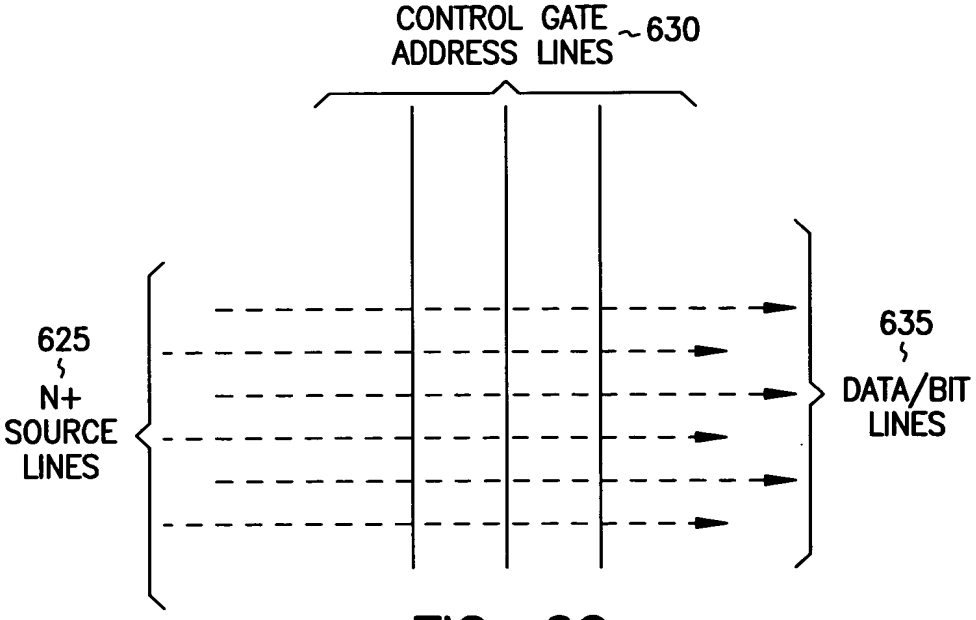

CONTROL GATE ADDRESS LINES ~630
625
N+ SOURCE LINES
635
DATA/BIT LINES

FIG. 6C

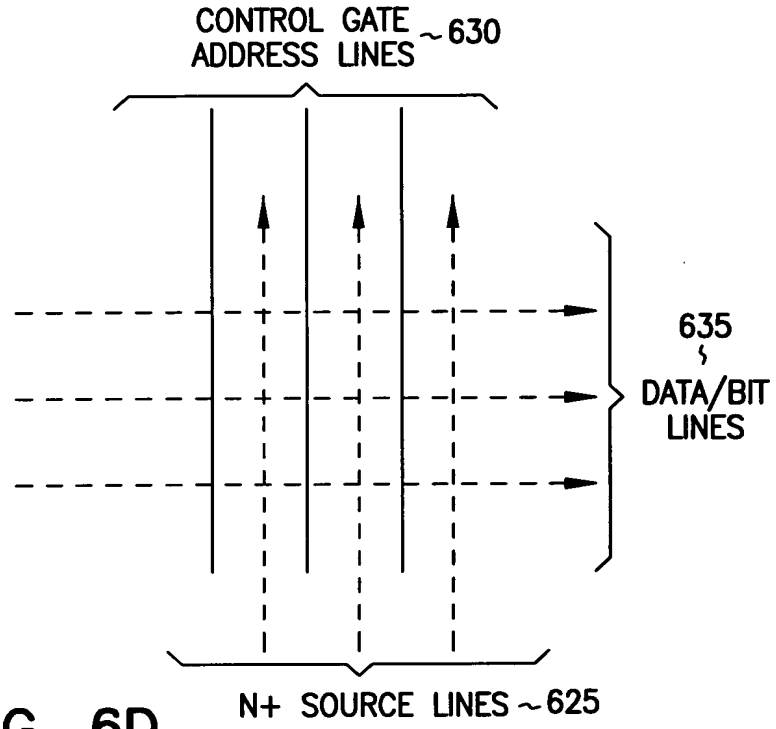

CONTROL GATE ADDRESS LINES
630
635
DATA/BIT LINES
N+ SOURCE LINES
625

FIG. 6D

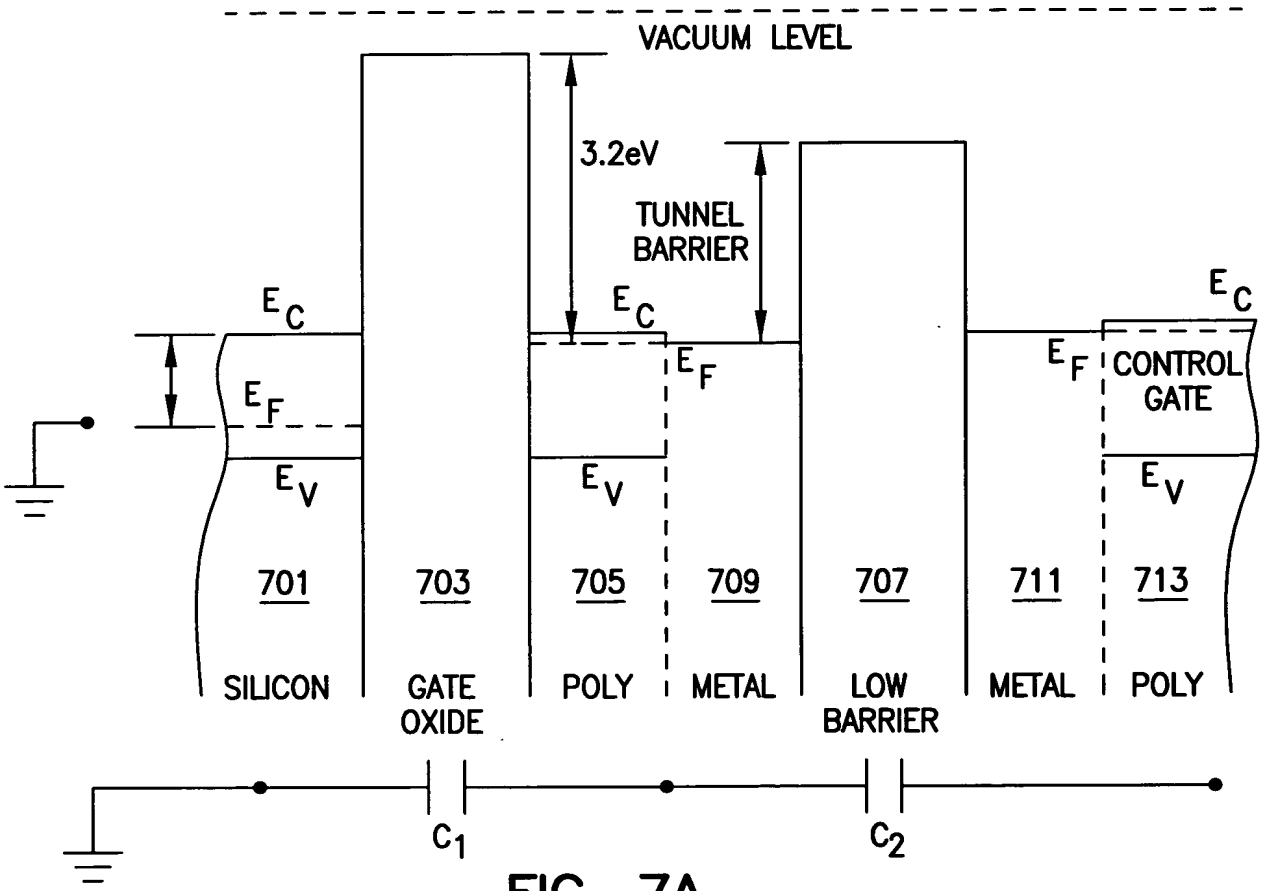
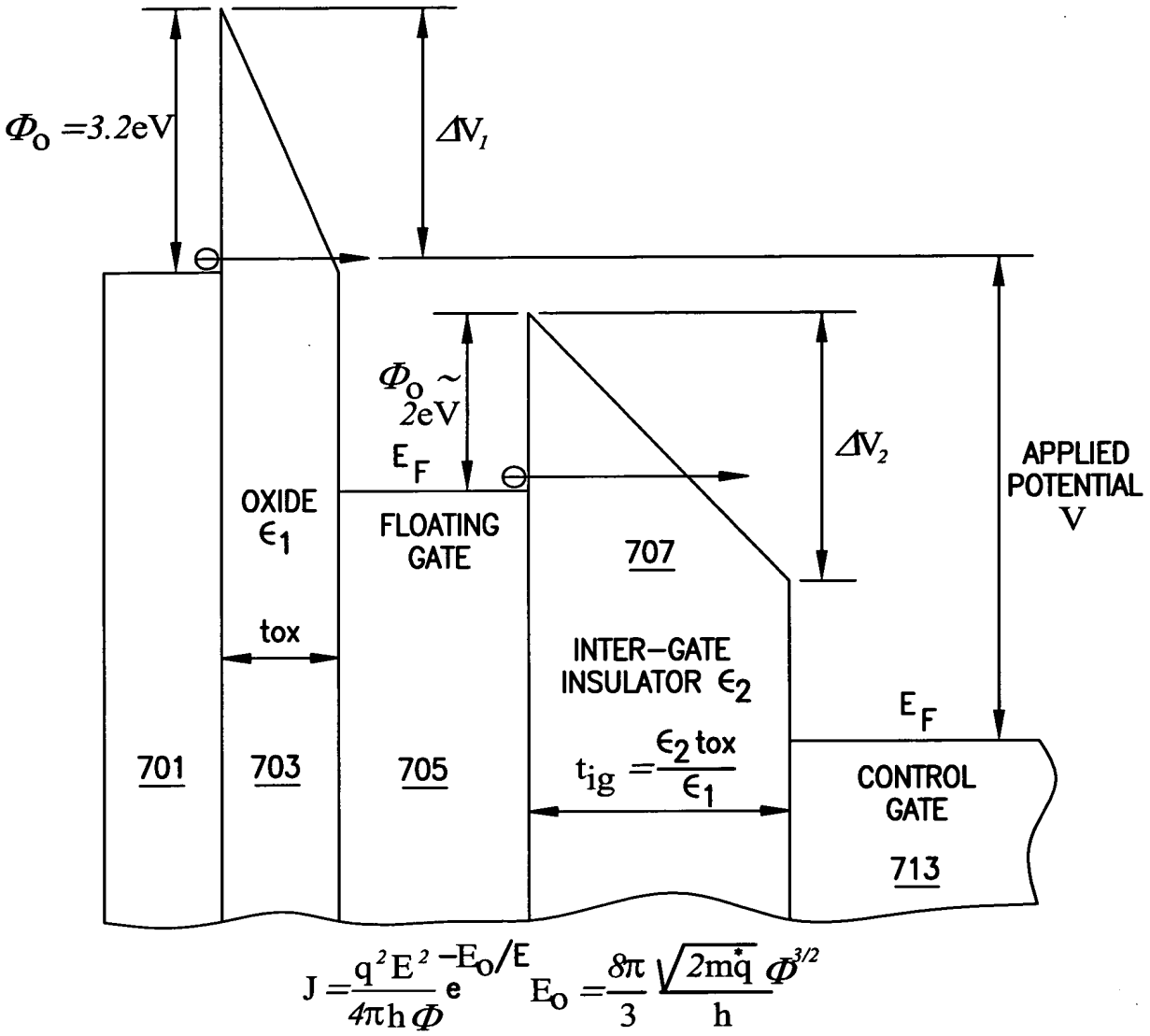

VACUUM LEVEL
3.2eV
TUNNEL BARRIER
E_C
E_F
E_V
CONTROL GATE
701
703
705
709
707
711
713
SILICON
GATE OXIDE
POLY
METAL
LOW BARRIER
METAL
POLY
C_1
C_2

FIG. 7A



$$J = \frac{q^2 E^2}{4\pi h \Phi} e^{-E_o/E} \qquad E_o = \frac{8\pi}{3} \frac{\sqrt{2m^* q}}{h} \Phi^{3/2}$$

FIG. 7B

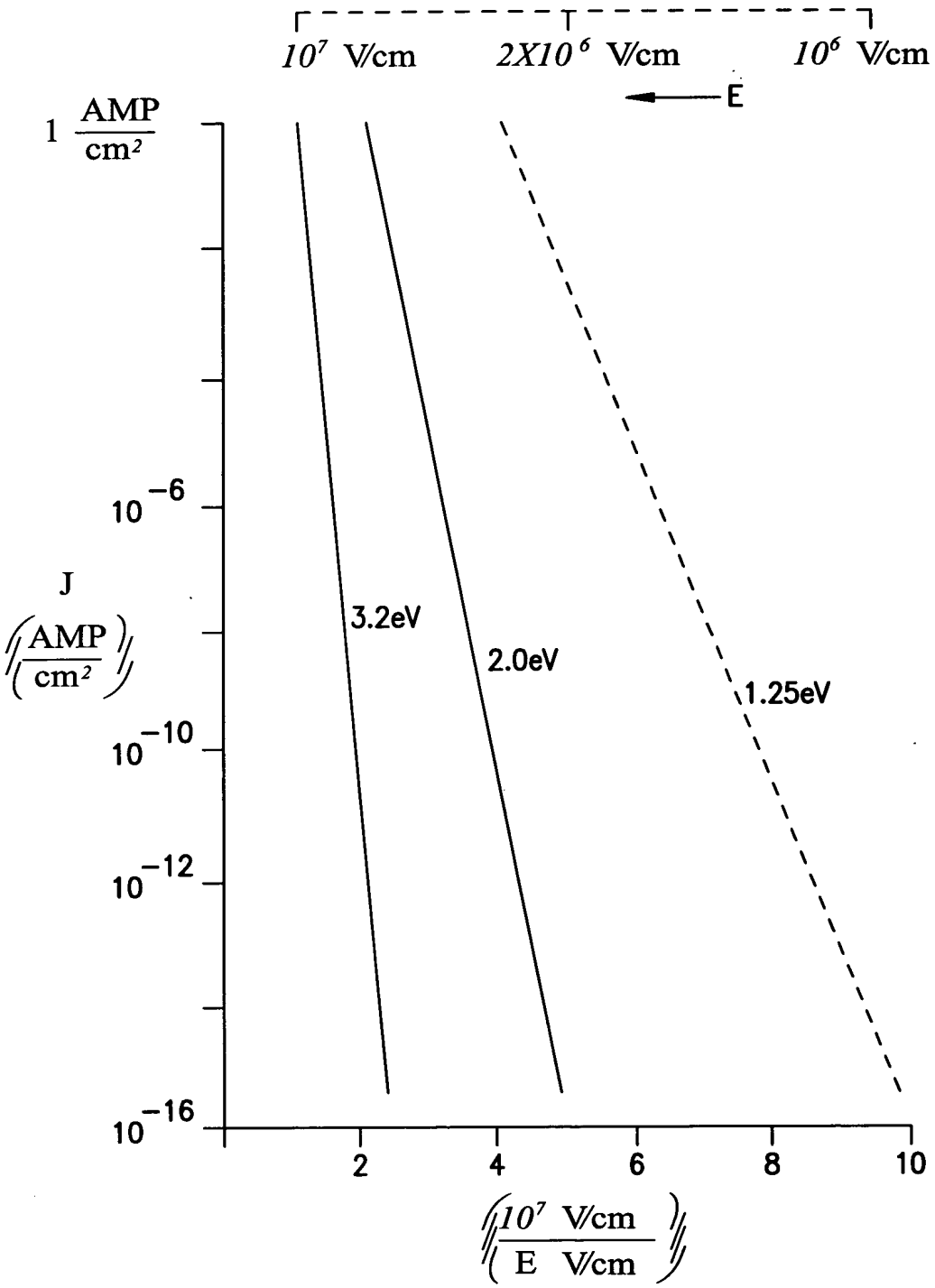

10^7 V/cm
$2X10^6$ V/cm
10^6 V/cm
E
1 AMP/cm²
10^{-6}
10^{-10}
10^{-12}
10^{-16}
J (AMP/cm²)
3.2eV
2.0eV
1.25eV
2
4
6
8
10
10^7 V/cm / E V/cm

FIG. 7C

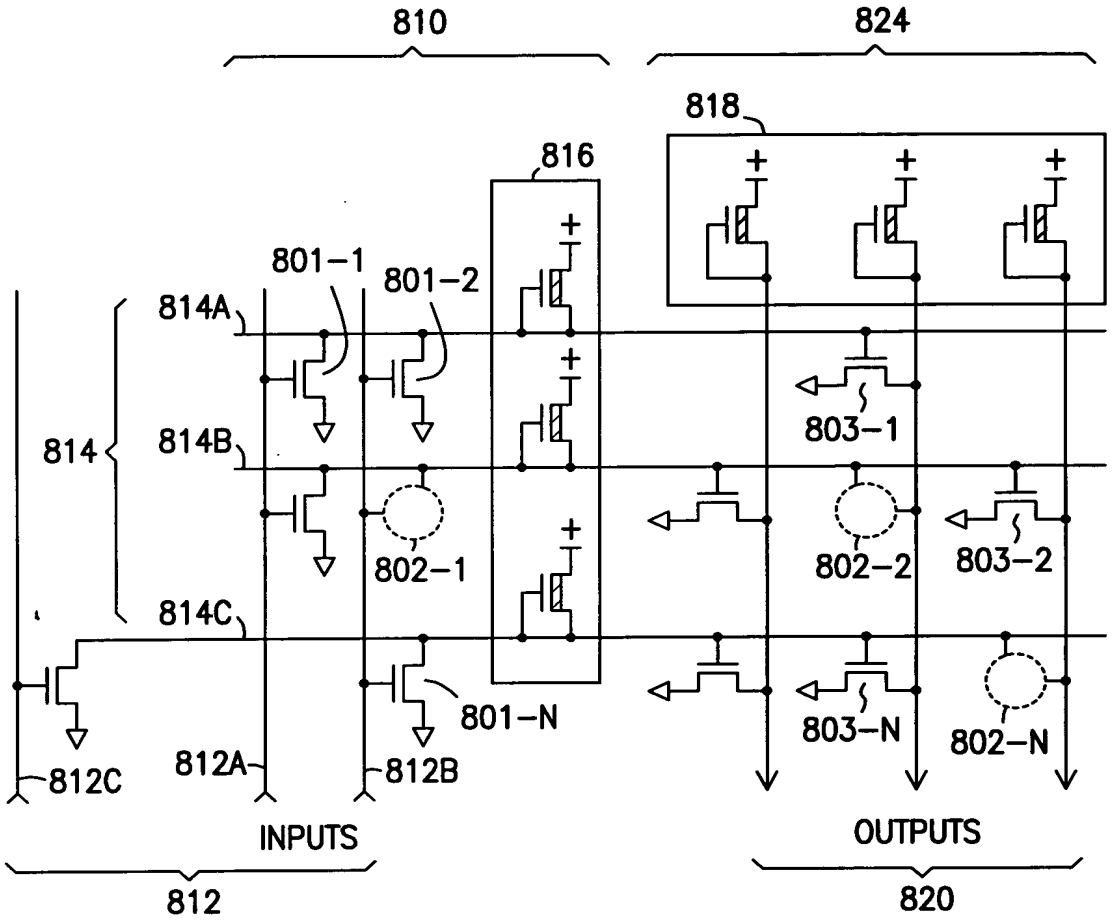

810
824
818
816
801-1
801-2
814A
814
814B
814C
803-1
802-1
802-2
803-2
801-N
803-N
802-N
812C
812A
812B
INPUTS
OUTPUTS
812
820

FIG. 8

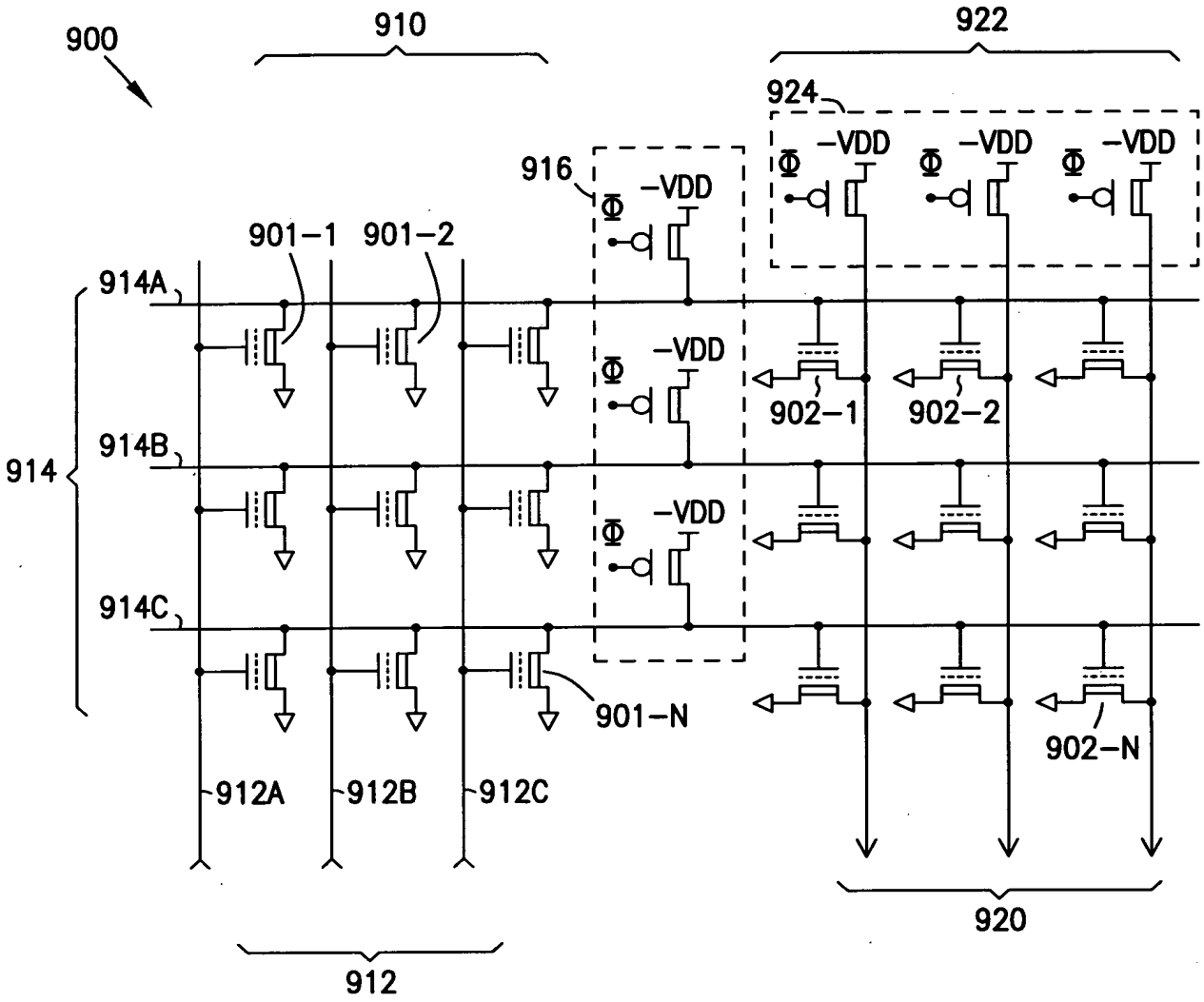

900
910
922
924
916
-VDD
Φ
901-1
901-2
914A
914B
914C
914
902-1
902-2
901-N
902-N
912A
912B
912C
912
920

FIG. 9

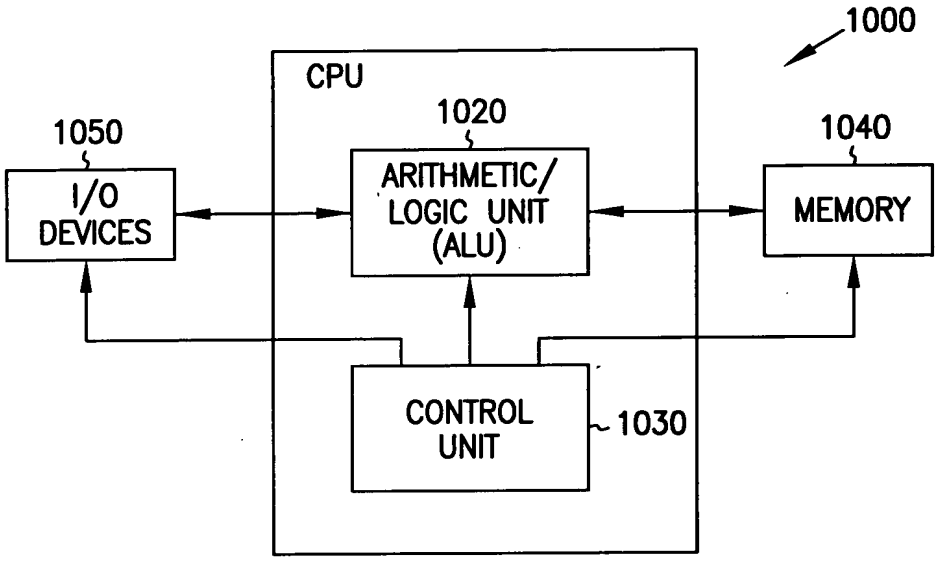

1000
CPU
1020
1050
1040
I/O DEVICES
ARITHMETIC/ LOGIC UNIT (ALU)
MEMORY
CONTROL UNIT
1030

FIG. 10